

# MACHINE LEARNING

“

Magic is just  
science that we  
don't  
understand yet.

-Arthur C. Clarke

...

throughthephases.com

”

It's still  
*magic*  
even if  
you know  
how it's  
done.

—Terry Pratchett  
Author of “Discworld”

# Artificial Intelligence

The theory and development of computer systems able to perform tasks normally requiring human intelligence

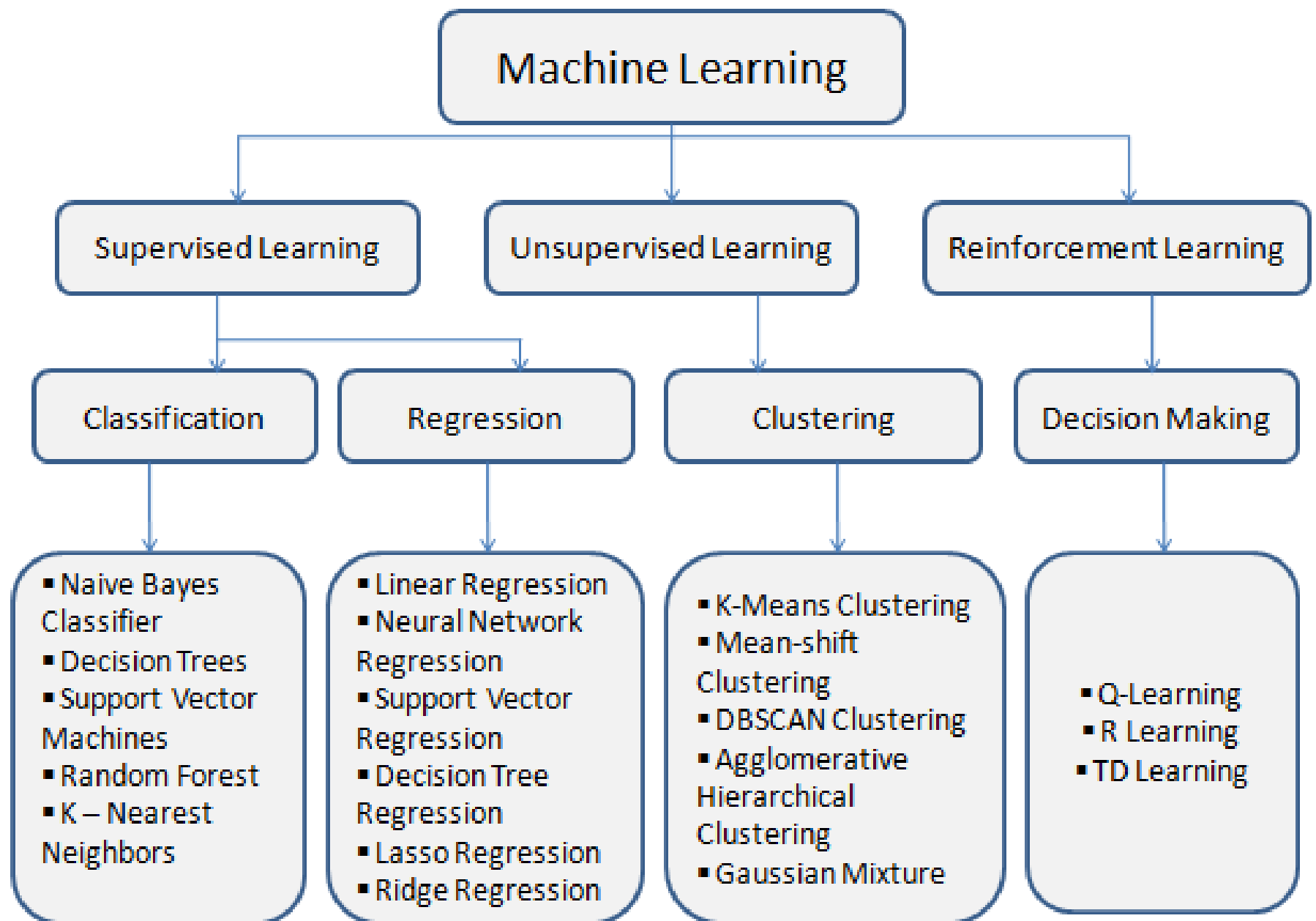
## Machine Learning

Gives computers "the ability to learn without being explicitly programmed"

## Deep Learning

Machine learning algorithms with brain-like logical structure of algorithms called artificial neural networks

**LEVITY**



# Linear Regression

5   9   13   17        

Find missing number in series ?

**6 , 13 , 27 , 55 , 111 , ?**

(1)225   (2)228   (3)223   (4)297

Exam Cracker

Which number continues the sequence?

5   7   11   19   35   ?

# The Magic: A Linear Equation

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- You may remember one of these:

$$y = a + b x$$

$$y = m x + b$$

- In the stats world, we just use a different notation:

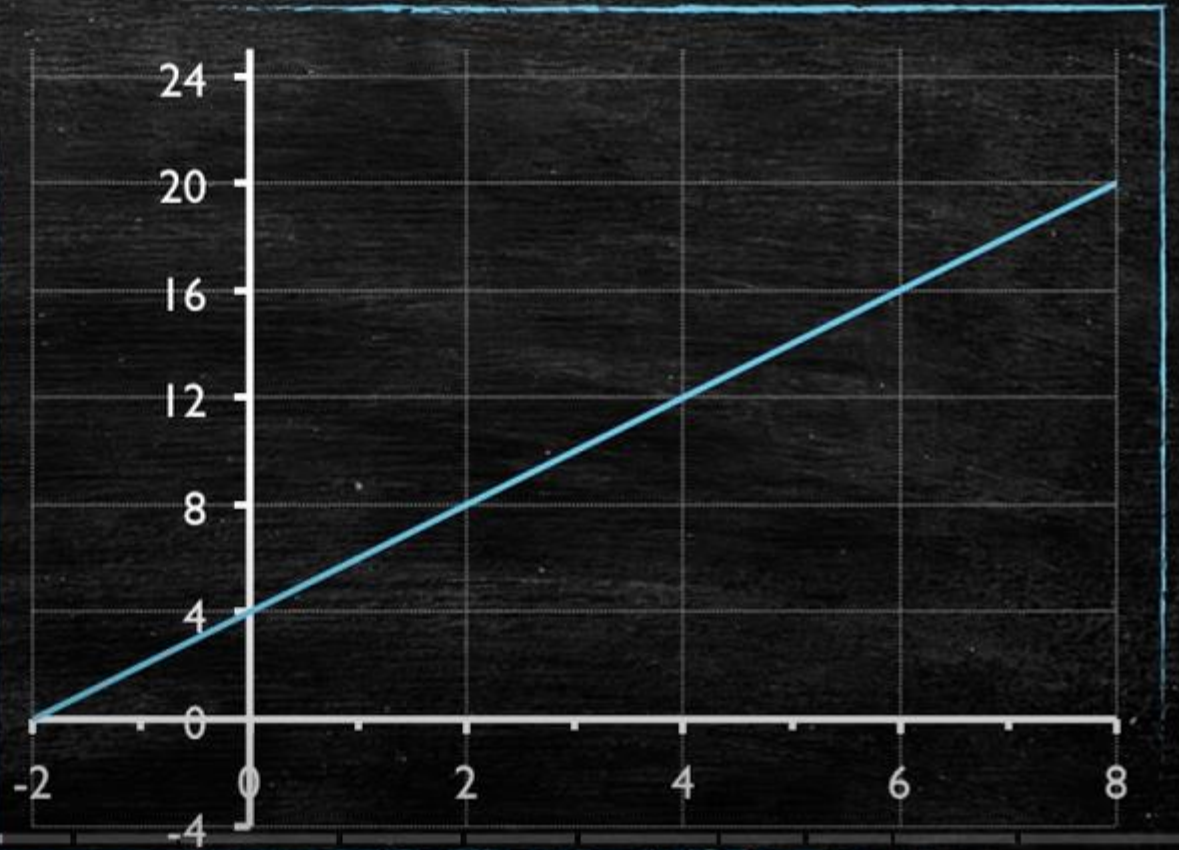
$$y = \beta_0 + \beta_1 x$$



# Linear Equation Example

$$y = \beta_0 + \beta_1 x$$

$$y = 4 + 2x$$

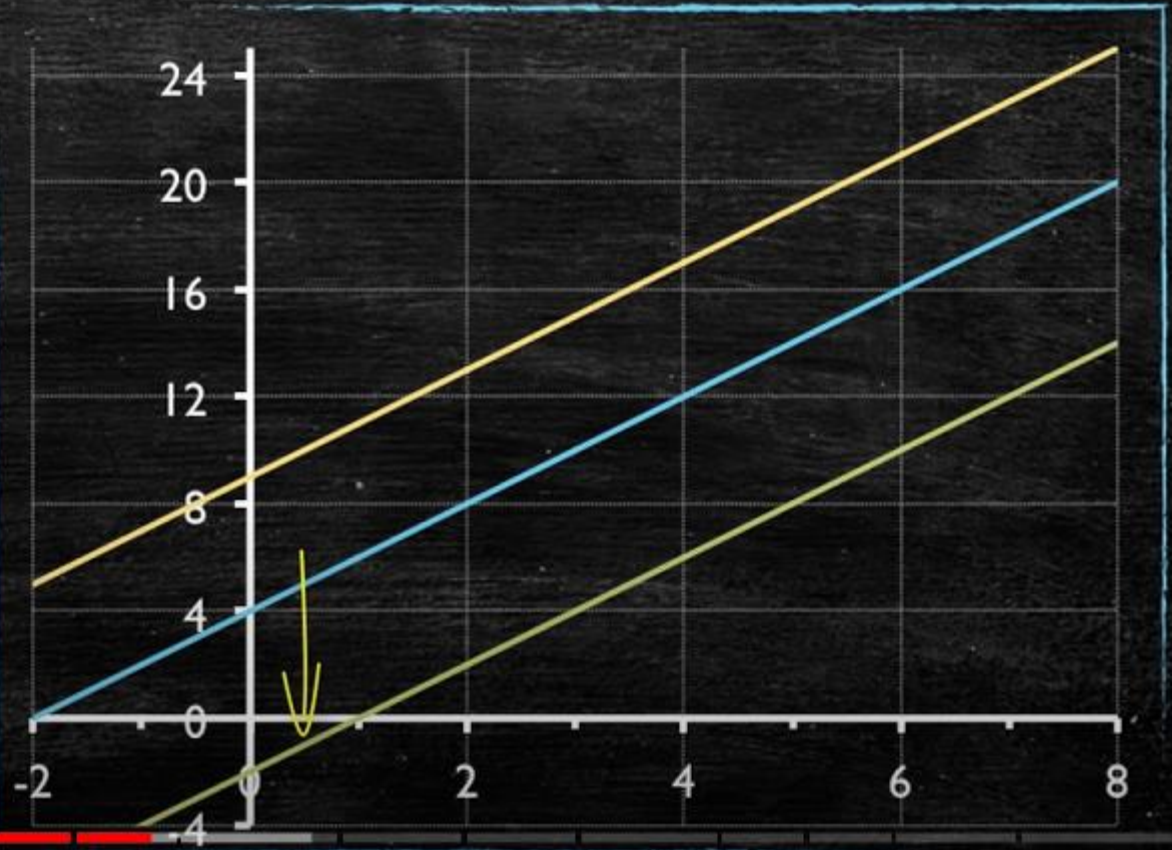


# What happens if we change the intercept?

$$y = 4 + 2x$$

$$y = 9 + 2x$$

$$y = -2 + 2x$$



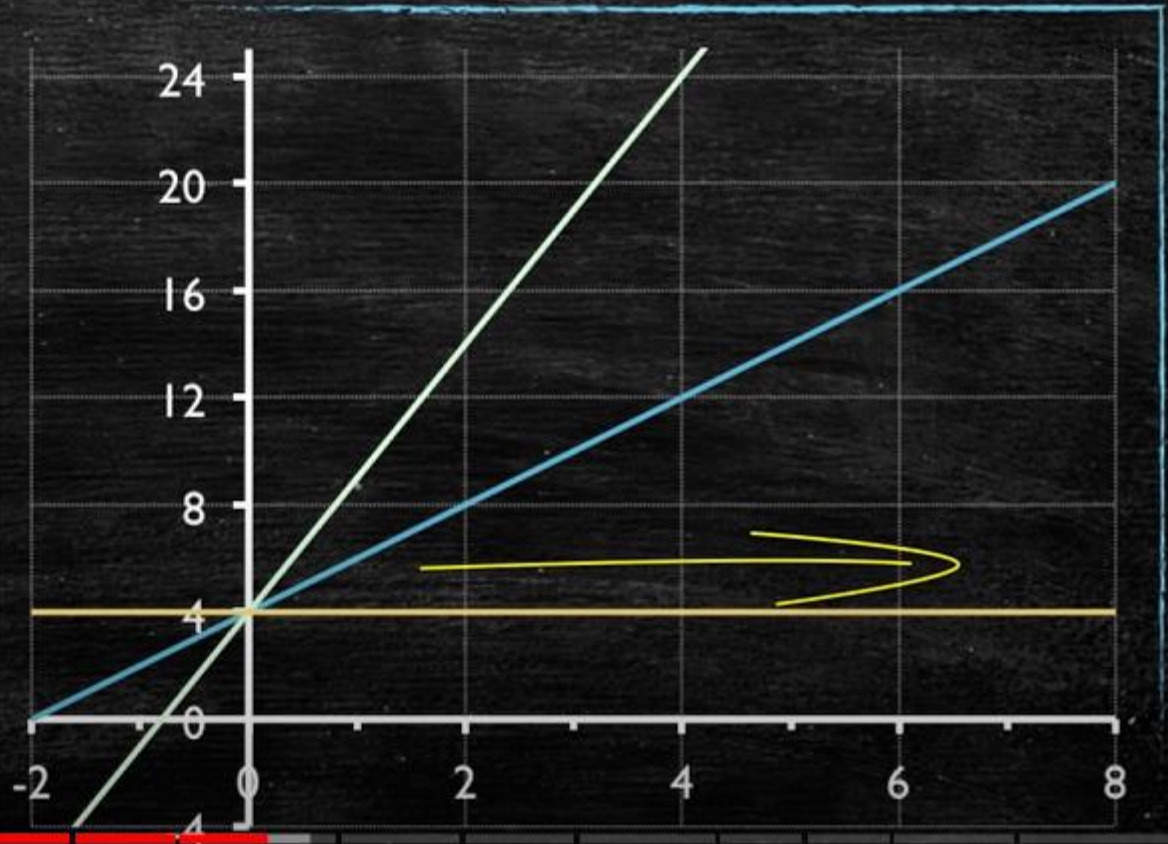


# What happens if we change the slope?

$$y = 4 + 2x$$

$$y = 4 + 5x$$

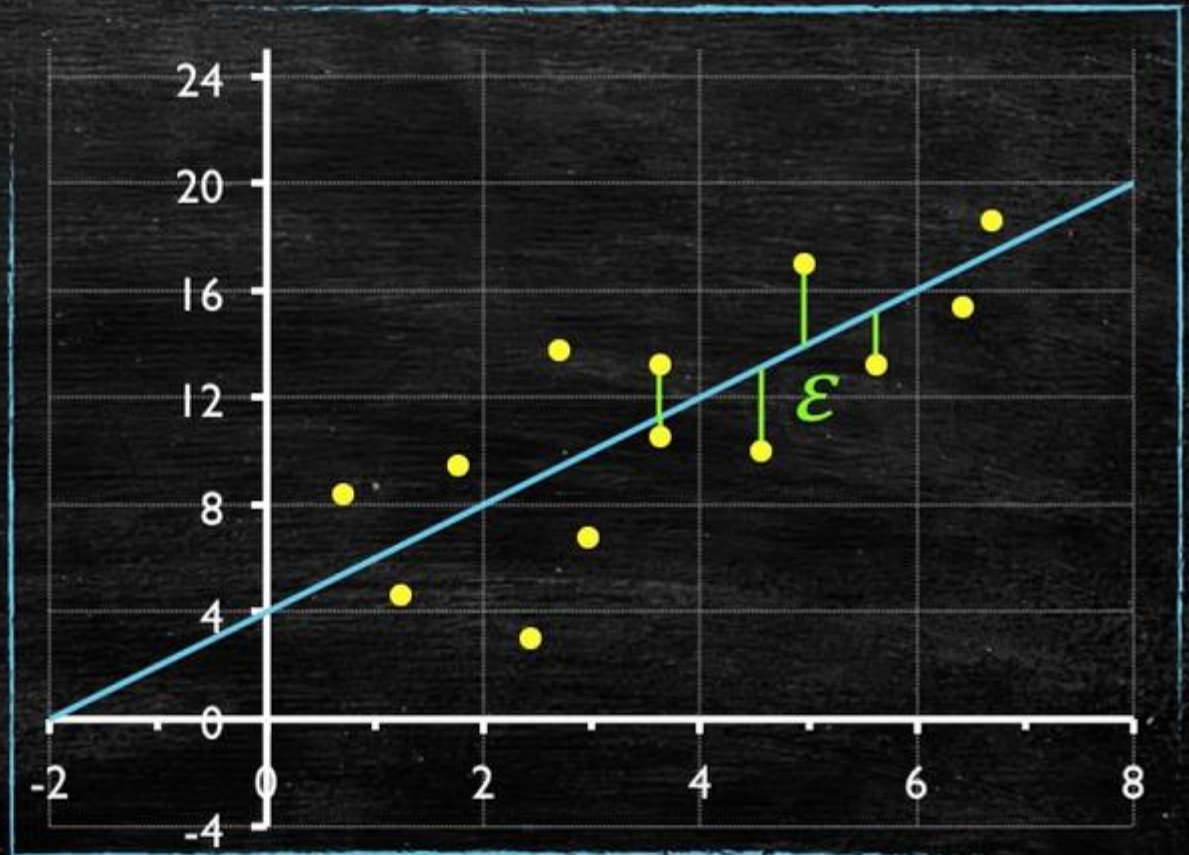
$$y = 4 + 0x \\ = 4$$

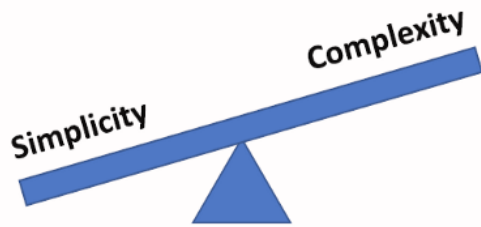


# But the world is not linear!

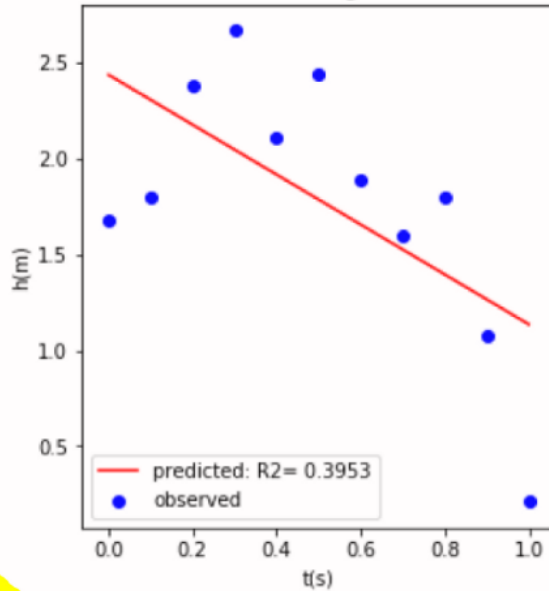
$$y = 4 + 2x$$

True Values





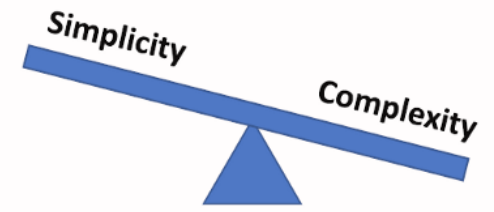
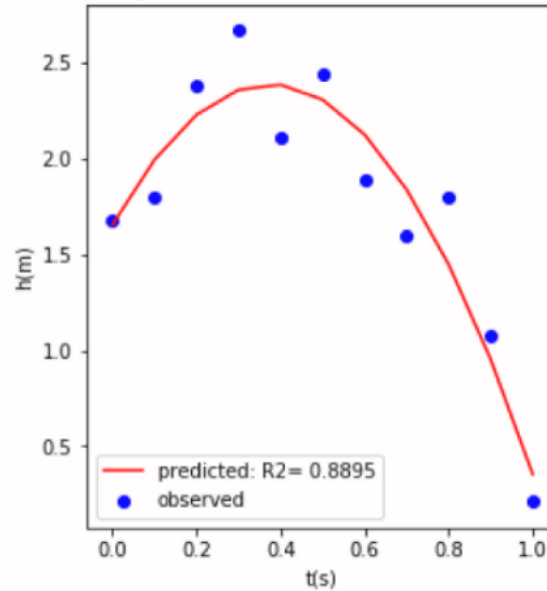
linear model is not good (underfit)



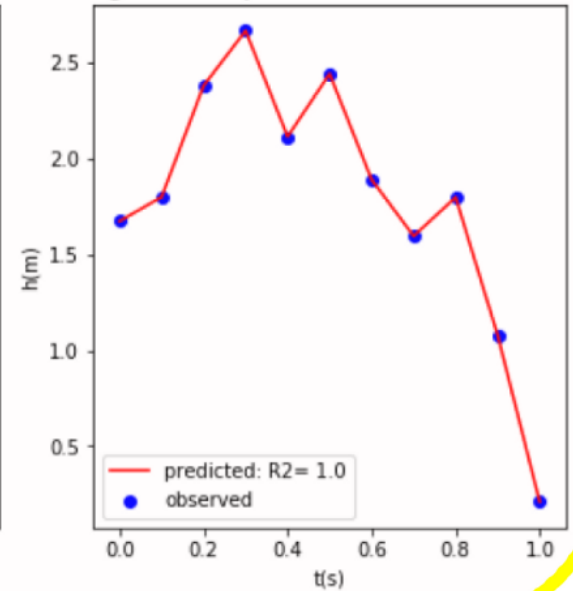
Simplicity Complexity



quadratic model is what we need



degree=10 captures random error (overfit)



Simple  
Linear  
Regression

Multiple  
Linear  
Regression

Polynomial  
Regression

Logistic  
Regression

Ridge  
Regression

Lasso  
Regression

Bayesian  
Linear  
Regression

Decision  
Tree  
Regression

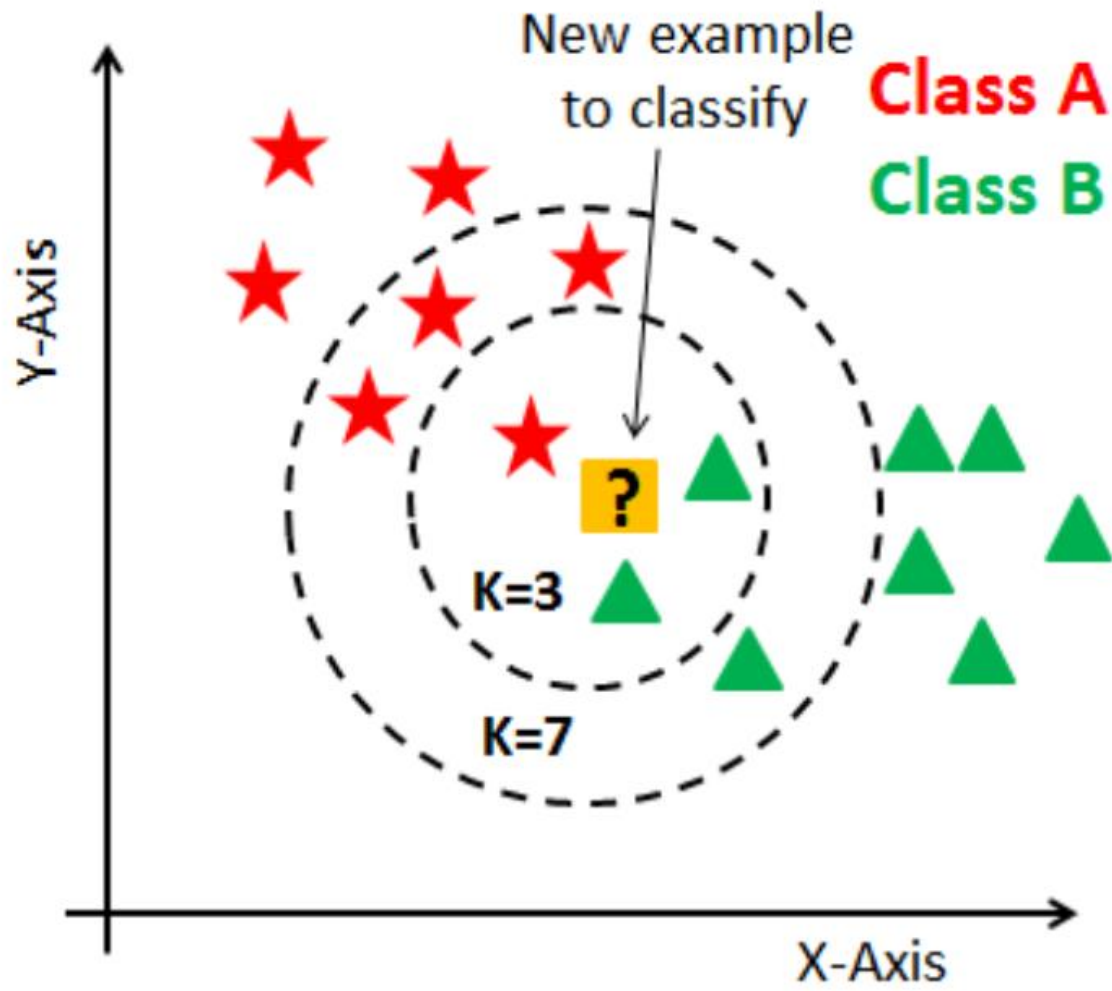
Random  
Forest  
Regression

<https://github.com/vjkr/Simple-Linear-Regression-Project.git>

[vjkr/\*\*Simple-Linear-Regression-Project\*\*](#)

# KNN Classification







**Iris Versicolor**



**Iris Setosa**



**Iris Virginica**

**iris setosa**



petal

sepal

**iris versicolor**



petal

sepal

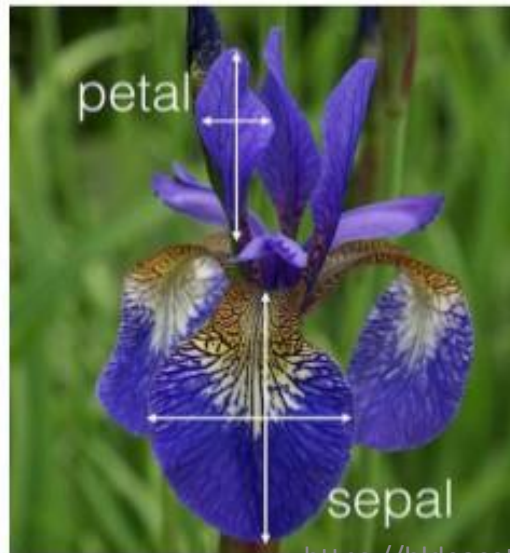
**iris virginica**



petal

sepal

**Supervised learning *classification* problem**  
(using the [Iris flower data set](#))



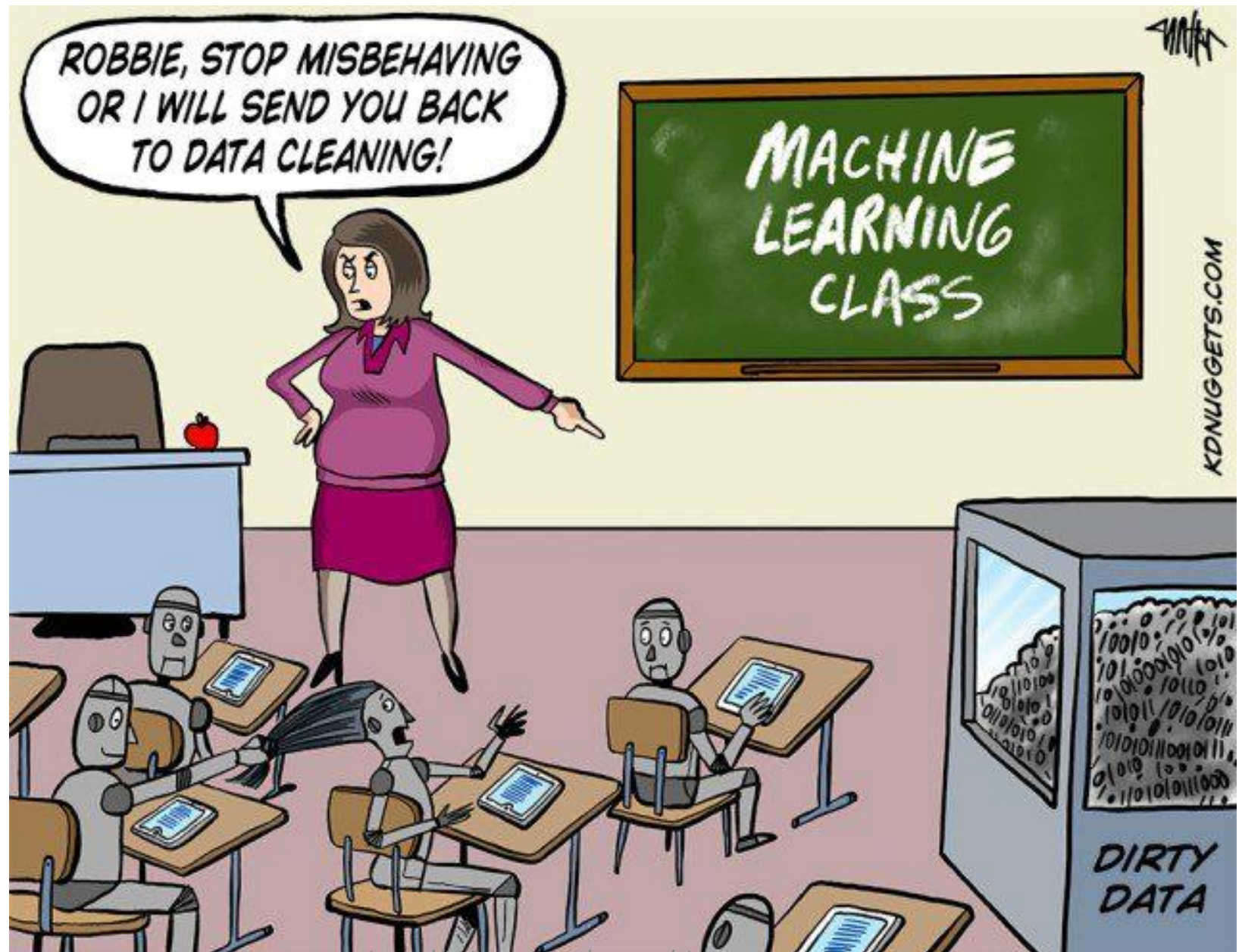
Training / test data

Features				Labels
Sepal length	Sepal width	Petal length	Petal width	Species
5.1	3.5	1.4	0.2	Iris setosa
4.9	3.0	1.4	0.2	Iris setosa
7.0	3.2	4.7	1.4	Iris versicolor
6.4	3.2	4.5	1.5	Iris versicolor
6.3	3.3	6.0	2.5	Iris virginica
5.8	3.3	6.0	2.5	Iris virginica

<https://github.com/vjkr/IRIS-Flower-classification.git>

[vjkr/IRIS-Flower-classification](#)



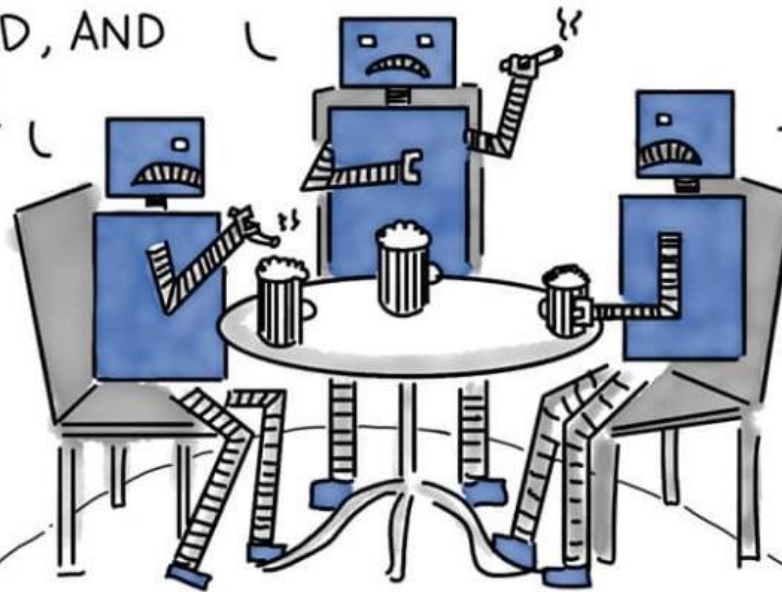




SUPERVISED:  
THEY GAVE ME SO  
MUCH TO READ, AND  
TESTS!

UNSUPERVISED:  
ME TOO. BUT AT LEAST  
THEY TOLD YOU THE  
ANSWERS

REINFORCEMENT:  
AT LEAST Y'ALL  
DON'T MAKE  
YOUR OWN BOOK!



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## Assignment 1:

Develop a linear regression model on a custom dataset.

*All the best!*